CAM

Roberts Capt.

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Exhaust-

The old Biblical metaphore, when applied to the Nazis, might well be paraphrased,—"he that lives by the blitz shall perish by the blitz"—for the same war of lightning mobility which Hitler launched on an unprepared foe has now turned against its creator.

Together with their brothers in battle dress, a share in this triumph must go to the men and women of Canada's motor industry.

Uniformed in smocks and overalls, armed with calipers and gauges, wrenches and welding torches, fighting in factory smoke, over draughting tables and in grease pits, this army of the assembly line has thrown over 600,000 military vehicles into the fight for freedom.

With the Hitler blitz in reverse, Canadian-made tanks, armoured fighting vehicles and trucks constituted a large portion of the transport used by the 8th Army when it pushed him out of North Africa; Canadian-made vehicles are relentlessly grinding him back along the torturous road to Rome; and Canadian-made vehicles are helping to make the second retreat from Moscow a dolorous happening for the Hun.

There has been no more momentous event in the industrial history of the world than this, the complete conversion of a nation's industrial system from making the plough shares of peace to forging the weapons of war. Its knowledge of management, its technical skills, its secret processes, its plants and its personnel have been enlisted in the service of King and Country.

The producer has toiled to expand his output, to meet the demands of changing war strategy. The worker has accepted long hours of hard and exacting toil,—and as a result Canadian made vehicles are rolling many miles nearer peace on the road to victory.

The close partnership of producer and worker, the new skills and new processes, the engineering research, and the energy and initiative on the home front has seen to it that "Too little and too late" is a forgotten slogan, and combined with the efforts of the fighting front will win the war and win the peace and build a greater Canada in the new tomorrow.

CAM

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"Oil, they say, "is ammunition" But the big idea is to use it against the enemy—not to shoot the guts out of our own trucks and tanks. And if you don't think oil or grease can do a pretty fair job of that if it's not properly protected and cared for before use—well, brother, read on.

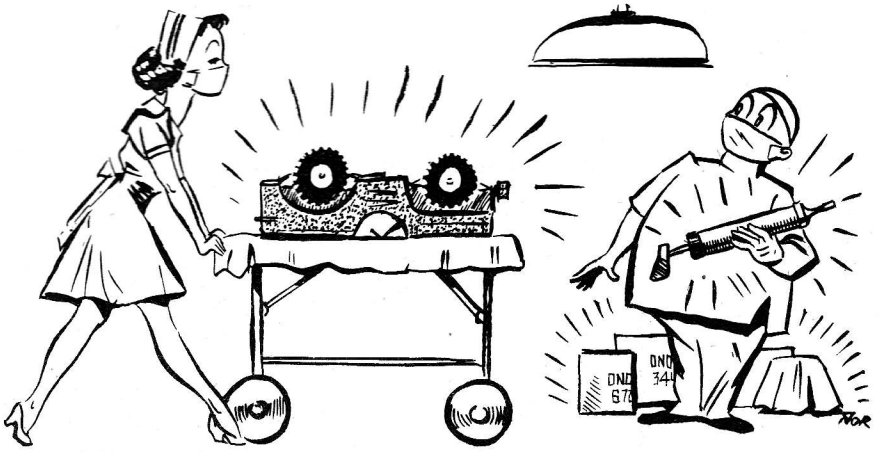
Lubricants can actually **promote** wear, rather than reduce it, if they're **not stored and handled carefully.** All you have to do is leave them alone for a spell—exposed and unprotected. Every speck of dust absorbed, every tiny morsel of so-called foreign matter, becomes a punishing abrasive that can raise hell with any vehicle you name. And don't depend on your naked eye or even the one in uniform, to tell you when a lubricant is contaminated. Maybe you can't **see** the dirt but a vehicle can sure **feel** it!

Remember, too, that perfectly pure water can make a mess of perfectly good oils and greases—and seriously reduce their lubricating value. Some greases, for instance, can pick up enough water to change their color, soften them up, and shift their chemical balance. When that happens, the grease causes corrosion in the lubricated unit and tends to run out prematurely, leaving the poor unit with its lube down. Engine oil, when contaminated by water, promotes corrosion, among other things, in the crankcase.

Vehicles are naturally the highest priced victims of tube contamination —but they're not the only ones. All your lubricating equipment, too, can easily be damaged by dirt and water in the lube. Grease gun and pump mechanisms become corroded, leathers deteriorate, check valves and plunger shafts get stuck. Dirt wears out everything too fast. So if you've got the idea that lubricants are an unmixed blessing, you're right—**provided** the lubricants are unmixed with dirt or moisture. Otherwise, you might do just as well with whipping cream or suntan oil.

Getting down to preventive measures, let's start with the lube containers. One reason for providing various sizes of containers is to reduce the danger of contamination. The 1 gallon and 5 gallon cans and the 45 gallon drums of lubricating oils and the 1 and 5 lb. tins, 25 lb. pails and 100 lb. kegs of lubricants and greases can be readily identified and emptied with a minimum of exposure. However, it's still mighty important to keep full containers tightly closed, well covered and as clean and dry as possible. Don't give dust and moisture any chance to do their dirty work. Ditto for measuring cans, which should always be rinsed out with solvent before using.

There are plenty of other things you can do to save lubricants, lube equipment and vehicles. Clean your grease guns thoroughly before and after use, being careful not to wipe dirt into the nozzles. Remove dirt from the swivel and threaded joints so it can't sneak into the operating mechanism or the lubricant container tube. Wipe grease fittings clean before applying a grease gun. Wipe off filler plugs and the areas around them. Before using a grease gun, squirt a little grease through the nozzle to remove any accumulated dirt. Do the same with an oiler. Before connecting an air hose to a grease gun, send a short blast through the hose to blow out dust and whatnot. Clean the outside of lubricator container tubes before sticking them in grease for a refill. Do likewise for the nozzle on suction-type guns. Keep cover clamps tight on bucket pumps **and never, never lay a grease gun on the ground.**



Even that isn't all. But you'll do a bang-up job of conservation and a vital one if you guard your lube's purity at every possible point, which is exactly the point of our story.

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DON'T BE IN THE DARK ABOUT HEADLIGHTS!

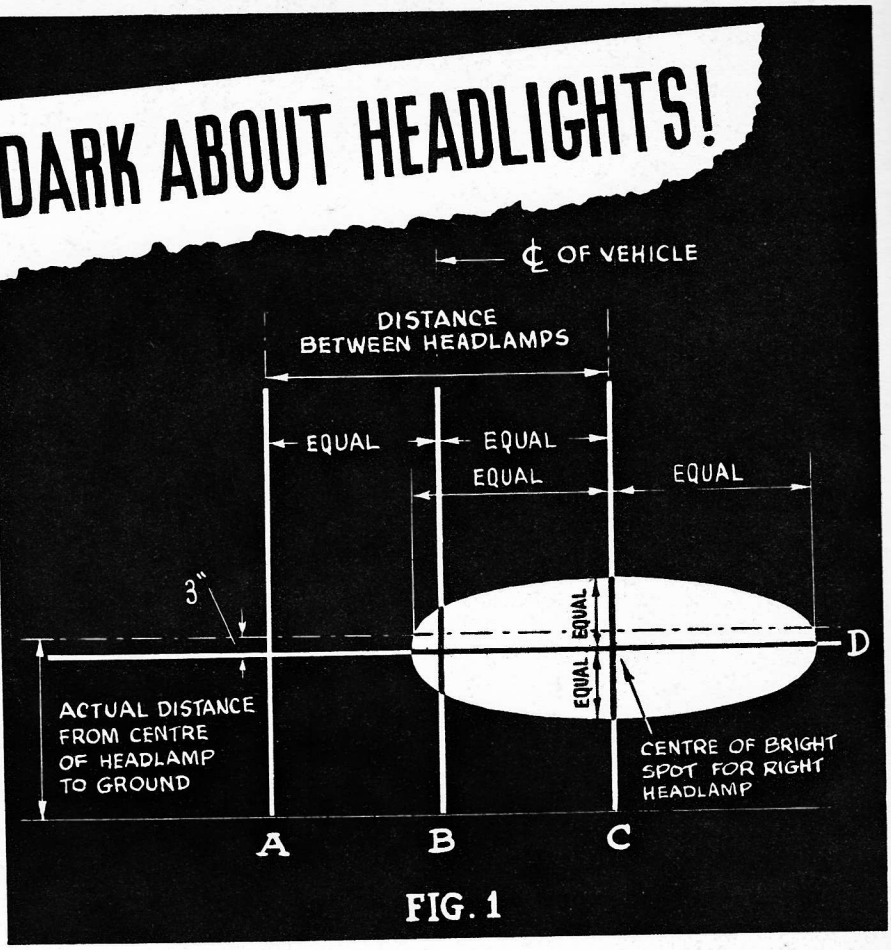

FIG. 1

For the sake of safety, and to get the maximum in road illumination, head lights must be properly aimed. If they're pointing too high, you're a menace to oncoming drivers—if they're too low, you can't see far enough ahead for safe driving. With blackout equipment not being used in Canada there's no reason (excepting in black-out training) for not making full use of good headlights. With this in mind, here's a formula that can be used to make a chart to properly aim the headlights on any vehicle.

First of all you need a level piece of ground and a light coloured vertical screen or wall. Then for each type of vehicle you'll need to mark lines as shown in the diagram. As the distance between headlights and their distance above the ground will vary with each type of vehicle you may need several screens to take care of all your vehicles. If you want to really do a smart job, get hold of some 2" × 1" or 1" × 1" wood and make up this universal aiming gauge. You need four poles —one of them 10 or 12 feet long for your horizontal line (D) (Fig. 1) three of them approximately five feet long for your vertical lines (A-B-C) (Fig. 1), Three 'U' clamps will hold them together (Fig. 2) and allow you to adjust them for any type of vehicle by following the diagram. Paint them white and lean them against a light coloured wall and you're all set to start aiming.

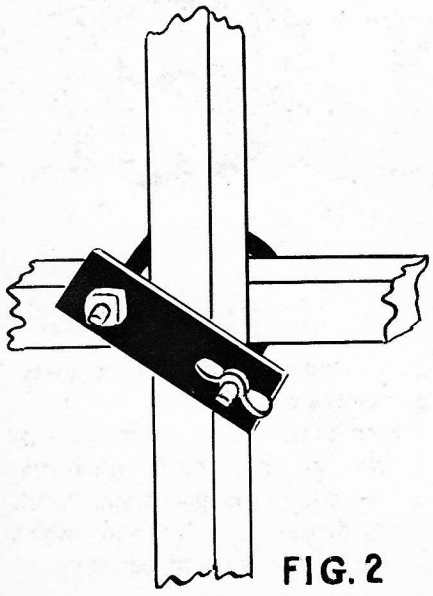

FIG. 2

To get accurate results make sure that the head lamps on the vehicle are always twenty-five feet from the chart and the vehicle centre axis is directly in line and at right angles to the centre line on the chart. Be sure too, that you're on the 'high' beam. Now cover one lamp to obscure the beam of light and adjust the beam of the other lamp so that the centre of the zone of highest intensity falls on the intersection of the horizontal line 3" below the headlamp centre and the vertical line directly ahead of the headlamp centre. Repeat for the other lamp. Don't worry about the **low** beam—it will automatically be O.K. if the high one is aimed as above.

If you're unable to aim the light beam to the desired position, with the adjustment allowed, check the bulb for a sagged filament or a loose reflector. Either of these conditions

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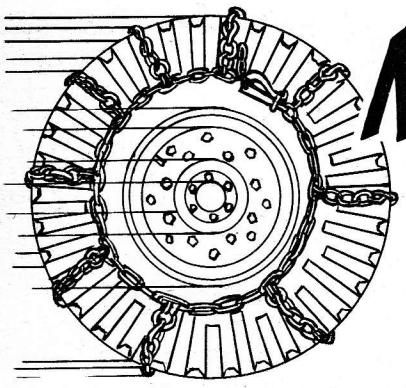


NON-SKID CHAINS

How to be Happy in the Chain Gang

Tire chains are provided with practically every wheeled vehicle to help get traction or grip on slippery surfaces. They may appear to be a rather brutal way of getting the driving wheels of a vehicle to grip the road—but at the moment we don't know of a more practical, simpler or easier way of doing this job.

We've heard plenty of arguments on the usefulness of chains—one group of experts tells you to stay away from the chain gang and the next tells you to join. Actually, of course, you haven't much choice. Chains are required by regulations —so use 'em—when **necessary.**

There's just one or two things that you should keep in your noodle when you join the chain gang.

First of all you've got to give chains a bit of care—and preventive maintenance. Keep them u n s n a r l e d, clean and ready to use. Keep an eye open for weak and badly worn links and if necessary, they can be reconditioned by ordnance workshops (as per Service Information Bulletin 'B' Veh. C-1).

The new ladder type chain is now replacing the 'tension' type and the installation procedure is a bit different. One of the main things to watch when installing is that the cross chains are evenly positioned on the tire and located in the depressions between the side wall treads. When they're on properly you should be able to pull the side chain out from the side of the tire about 3 inches. Get all the details on the job of installing them by looking up the Service Information Bulletin ('B' Veh. C-3).

Now we come to using them.

First of all there are two kinds of ice and snow. Soft drifting snow and mushy ice; and hard slick ice and hard packed snow.

On soft ice and snow you'll find that chains are a big help. There's no question about that. Chains on the rear wheels alone will decrease braking distances and increase traction about forty per cent compared to no chains at all. Chains all round decrease breaking distance about sixty per cent compared to the bare tire figure. So you see they are a big help on wet ice and snow.

But don't get the idea you can always count on them—because a slick patch may be underneath a loose top covering. Wise is the lad who uses chains all round—then drives as though he wasn't using chains at all. And also remember that chains are only good when you're going straight ahead. They d o nothing to stop a side slip. Nothing is going to help you on slick ice and packed snow except careful driving Chains can be actually dangerous in

(Continued on page 80)

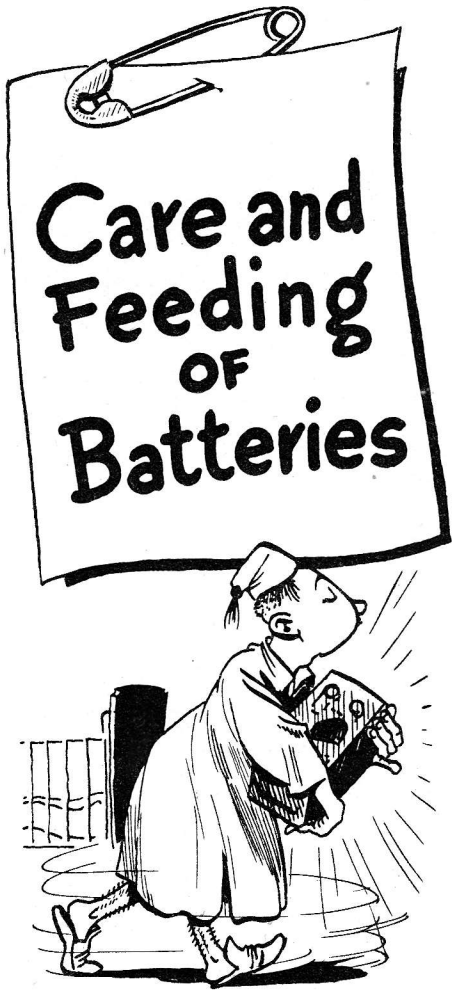
CLEANING HYDRAULIC PARTS

Paddington—our foreign correspondent covering workshops — came into our foxhole yesterday, waving a new workshop bulletin and a dollar he owed us. Grabbing the dollar, we were about to throw Paddington into a nearby snow drift when we happened to notice the words "Alcohol is recommended" in the bulletin. Thinking it might apply to us we snatched the bulletin from Paddington as he whizzed by. Imagine our disappointment upon reading it to find it dealt with cleaning Hydraulic Brake parts. It pointed out that special care is required in cleaning the internal component parts to keep the system free from foreign matter (lucky we threw our foreign correspondent out when we did) which may deteriorate the rubber cups or result in freezing in cold weather. Could it be, we pondered, that some people are cleaning them with Varsol— no it couldn't be—surely no one would do that. We must have a horrible mind to think of such a thing.

Clear Wood alcohol is first on the hit parade as a cleaner with denatured alcohol as the next best. A five gallon can should be available for all hydraulic brake cleaning jobs. If its not available from stores it's suggested that you indent through District channels for local purchase authority.

What'll you do while your waiting for the alcohol?—In emergency use clean brake fluid—(or that 99 proof in the tall bottle you've been saving for emergency—eh?— well, we're only trying to help!)

The second of two articles on the . . .



Sylvester, the tall boy with the bald head, rubbed his skull. "Why," he asked, "Why is it batteries always die out in the morning just when you gotta go somewhere in a hurry? What is it, bad luck or somethin'? I tried hangin' horseshoes over the garage door," he rubbed the dent in his skull, "But they don't help . . ."

"Why don't you try hanging yourself over the garage door, Sylvester," we suggested, "or better yet why don't you try taking care of your battery?"

Strangely enough, Sylvester is wrong about horseshoes over the garage door but he's right about batteries petering out in the morning just when you want to get somewhere. Statistics show that 75% of battery failures occur in the garage and 66% are discovered in the morning when the poor sucker is in a hurry to go.

What does it? It's really no mystery—it's usually some kind of short-circuit or other drain on the battery. During the day, while the vehicle is being run, the generator puts back the juice as fast or faster than it's leaking out. But during the night while the little vehicle is sleeping, the juice drains out without being restored—then when you come tearing out next morning, the battery is dead.

Again, with the vehicle running around during the day, the engine is hot and the oil loose so it's not a strain on the battery to turn the engine over. But in the morning, with the engine and oil stiff and cold as a bag of old bones, the weakened battery just doesn't have what it takes. Mr. Moto no go.

As we said in the article last month, batteries are a genuine miracle but you can't make a sucker of them. A certain amount of care is required.

The first big item of care, is the water in the battery. This is broken down into gasses (hydrogen and oxygen) during charging, and in the summer time a lot of it evaporates off. It's got to be replaced.

"How often does the sulphuric acid need replacing?" Sylvester wants to know.

Catching him neatly behind the ear with a well aimed beer-bottle, we answer, "As far as you're concerned, never. The sulphuric acid isn't broken down during charging and it doesn't evaporate. All it does is waltz in and out of the plates —so if you don't drink it or let electrolyte spill out of the vent plugs it ought to last the life of the battery."

To keep the electrolyte from spilling, the level of water added to the battery should not be more than 3/8's of an inch above the plates. Hotted up electrolyte has to expand somewhere, so if the level is too high it expands out the vent hole in the filler plugs. Not only is the electrolyte lost, but the sulphuric acid in it eats away and corrodes the metal parts in the vicinity: the battery cradle, the cables, etc.

Some well-meaning nature-lovers we used to know, once insisted that only distilled water be used in batteries. But as we pointed out in an article last month, if you don't have distilled water, add tap water—but let the tap run for a minute so you won't get the dirt and rust hiding in the pipes. Dirt and rust in the battery water, cause the cells to work funny or not at all. They might dissolve in the electrolyte and get deposited on the plates during charging—insulating the plates and taking them out of the ball game. Let that tap run. In cold weather, when you add water, add it just before the truck goes for a ride so the water will mix thoroughly with the electrolyte. Otherwise it'll stay on top and freeze. Water that's part of the electrolyte when the battery is well charged is pretty safe, because electrolyte freezes only at very, very low temperatures.

Each and every cell of the battery should take the same amount of water as the others—if not, look for leaks in the container or slop-over from the vent plug. If the system uses two batteries in parallel, as in some vehicles, both batteries should charge and discharge neck and neck. If one battery always needs more water than the other, it's probably getting more current, there could be a leak somewhere—See that its noted on your CPMS sheet.

The second big item in battery care is charge. In discharging, the electrolyte creeps into the plates, changing them more and more into lead sulphate. "Sulphated" plates —as they're called in their dying

stages—are strictly from hunger and won't produce anything but headaches. The battery has to get a c h a r g i n g—enough charging to change this lead sulphate of the plates into the sulphuric acid of the electrolyte.

Breaking it down fine, the charging-discharging situation is this: enough charging current has to be shipped to the battery to balance the electricity taken out (in starting, etc.). If five cents worth of electricity is used in starting the engine, five cents worth of electricity must be sent back by the generator to peel the lead sulphate offen the plates.

This means you can't grind the starter, play the radio, turn on the heater and light the lights carefree-like without running the vehicle enough for the generator to compensate. Just remember that. And remember that the battery has to be kept at or near full charge—no fair letting it fall down, then suddenly trying to rescue it in the nick of time. The lower the charge in the battery, the lower the pressure (voltage) from it—low pressure is good for ringing doorbells, not for starting trucks. Learn your lesson from Fig. 1.

As a matter of fact, let the charge get too low and you'll never get it up—too much sulphate on the plates.

Talking about battery charging—this is a good time for you to get something straight. People w h o write about batteries like to say that the batteries 'store up' electricity. Their story is that as the generator passes it's surplus electricity along to the battery, it is put up in small packages or something and laid away like potatoes for the winter. **This** is noise—straight malarky.

What actually happens is that charging dissolves the lead sulphate off the plates (returns it to the electrolyte) and makes them fitten to produce electricity again. Kind of clears the decks for action. It's the independent action of the two kinds of lead (one lead peroxide, the other sponge lead) swimming in electrolyte, that actually produces electricity. No such thing as little packages of electricity stored away. Them battery people, tsk, tsk.

What about the amount of charge in the battery?

The amount of charge in the cells depends on the amount of sulphuric acid in the electrolyte. Well, how do you know how much sulphuric acid is in the electrolyte?

Answer: by the specific gravity of the electrolyte. The specific gravity is 'the weight of any substance compared to the weight of the same volume of water.' The specific gravity of water is 1 or as the smart money says, 1.000. Anything with a specific gravity of two is written 2.000, meaning it weighs twice as much as water. For instance, if a short beer weighs 6 ounces, and water in the same glass weighs 3 ounces, the beer is twice as heavy as the water—which means it's got a specific gravity of twice, or 2.000.

The electrolyte in the battery is a little heavier than plain water—1.150 to 1.280 as heavy. That's its specific gravity.

Since all you have to do is compare the weight of one thing with the weight of the other, we could find out the specific gravity of the electrolyte by weighing equal amounts of electrolyte and plain water on butcher scales. But they didn't put butcher scales in your 'driver's tools and equipment.' You'll have to use a hydrometer. The hydrometer works on the old gag that 'a liquid exerts a lifting pressure on anything floating on it.' The lifting pressure depends on the liquid's density or specific gravity. Just like fat women float higher on salt water than plain water. (Fig. 2).

To take a hydrometer reading, (one cell at a time, Bub) you squeeze the bulb in the syringe, dip the stem in the electrolyte and unloose the bulb to draw up some of the solution.

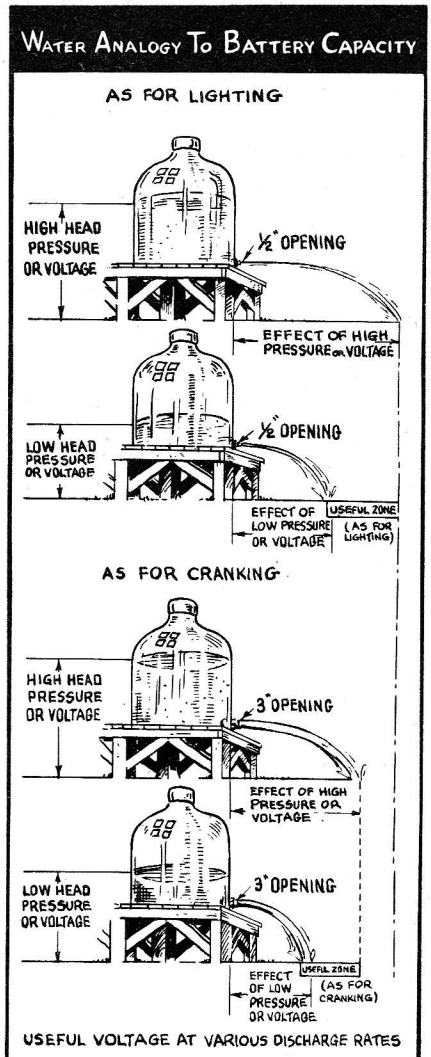


FIG. 1. It's Volts (pressure) that count—and it takes a well charged battery to dish them out.

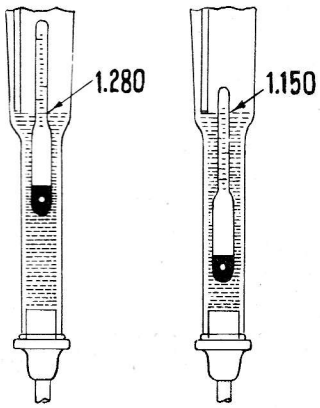


FIG. 2. A couple of hydrometers minding their own business. (Cut off view.)

You read the specific gravity on the hydrometer scale by holding it up to eye-level and squintin' at the surface of the liquid in the tube:

1.280.....Full charge
1.225.....Half charged
1.150.....Discharged

1.225 is rock-bottom for you—a battery with a lower reading should be taken out for a charge and should be examined.

You can take hydrometer readings any time except just after water is added (give it time to mix with the electrolyte—run your truck for a day or two after adding the water.)

Sylvester is here again, he wants to know "what do I do with the electrolyte I drew up in the hydrometer?"

"Put it back in the same cell you took it out of, Honey."

Besides operating conditions, certain other things can lower the charge in the battery. Remember any time the battery circuit is closed, (light switch turned on, etc.) and the generator isn't working, electricity is running out of the battery

A short circuit like a bare wire rubbing against the frame will drain the juice out through the long hours of the night. An ignition key or other switch left on does the same.

'High resistances' greatly reduce the power that can be put into or taken from the battery. 'High resistances' are places in the system where it's hard for the current to squeeze through. In a coming article we'll give you all the dope on tracking down High Resistance.

Other things waylay the electricity the generator is trying to send back to the battery: like heaters, lights, ignition and other electrical accessories. And starters in bad shape eat it up like it was free. Too-heavy crankcase oil whistles away battery juice by making it hard for the starter to turn the engine over.

Ah, Sylvester wants to say something again, "Yes"?

"The battery could fizzle 'cause maybe the generator ain't shootin' enough juice back to the battery."

"So?"

"You could easy fix it."

"How?"

"You could take and set the voltage regulator up to deliver more juice to the battery."

Stepping down from the platform, we walked quietly to where Sylvester was standing. Seizing his hand we shook it violently—being very careful to break every bone in his arm up to the shoulder. "Keep hands offer the voltage regulator—if there's any setting to do—and there usually isn't—an authorized mechanic in a workshop will do it—which fact ends our lesson for today".

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For B.F.s

ONE ON THE BUTTON

". . . Nothing could be simpler. . ."

It is one of the anomalies of motor vehicle design that nearly everything the manufacturer invents to save the driver trouble provides the driver with yet another opportunity to make trouble for himself. Especially if he is a B.F.

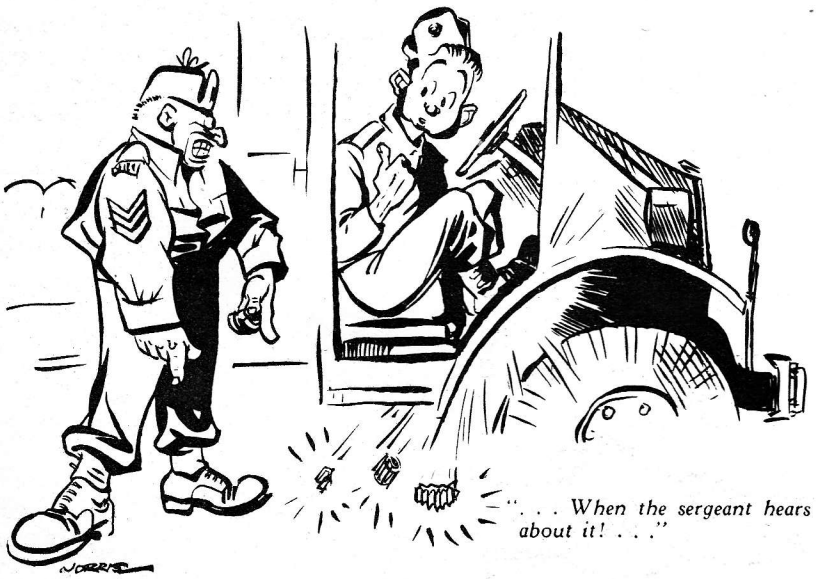
Remember what we've been saying about the choke? Well, much the same thing applies to the electric starter.

There was a time when the driver had to crank an engine by hand. It strained his stomach muscles and his temper. If he went about it in the wrong way it sometimes broke his thumb. So the manufacturers provided him with another button to push or a knob to pull, and everything in the garden was lovely.

But even in the garden of Eden, the human element crept in and spoilt the party. And Adam had nothing on some of the fellows who drive vehicles. (There is no pause after "nothing on", by the way.)

The starter works something like this. When you pull the knob or press the button, you complete an electrical circuit. Current from the battery causes a gear to rotate and this gear meshes with a gear on the flywheel and turns the engine.

Nothing could be simpler, you say. But then perhaps you haven't taken a good look at some of your fellow drivers. Actually, there are two fairly big pitfalls, and most of us have tumbled into them at some time or another.



". . . When the sergeant hears about it! . . ."

The first is that the starter motor takes a lot of current. If you use it too freely the battery may give up the unequal struggle, and both it and you will be left flat. Don't carry on tugging at the starter knob, therefore, if the engine doesn't fire. Find out **why** it won't fire. And if you have to do a lot of cold weather starting, ease the engine a bit first with the crank.

The second pitfall is not quite so obvious, but it can be even more disastrous. When the engine begins to turn, the starter gear is flung out of mesh. It ceases to rotate, and, if all goes well, the engine continues to run. If the engine **doesn't** continue to run, however, the starter knob has to be pulled out again. And here, for once in your life you are requested **not** to jump to it.

Always wait a few seconds before you have another go at the knob. If you don't, the starter gear (which has stopped revolving, remember) will meet the flywheel gear while the latter is still going round. The meeting won't be very gentle, and there may be a few gaps left where there used to be teeth—a state of affairs which, we venture to predict, may possibly be repeated when the sergeant hears about it!

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There are three approaches to the problem of starting a vehicle that refuses to start.

The first is to pick up a stout club and race around the vehicle threshing it madly, meanwhile uttering fierce, half human cries. This may not start the vehicle but it's wonderful for the nervous system.

The second approach is the process of elimination method in which the mechanic goes over the vehicle changing parts until he finally strikes upon the root of the trouble and the vehicle starts.

We realize of course that not all mechanics are electricians or ignition specialists, but still when we see these guys wasting time and materials changing parts, when a screwdriver in the hands of a wide-awake man acquainted with the proper procedure would find the trouble before they could say Jack Robinson, well—it makes our blood boil.

With our blood boiling at a merry rate, we therefore suggest the third or "brain trusters" approach to starting a vehicle that refuses to start.

"Woody" McDoghouse, our demon trouble shooter, entered into the spirit of the thing and from the depths of his abysmal fund of knowledge emerged with the statistically supported fact that 90% of the time it's the ignition system that's causing the trouble, with the fuel system as runner up.

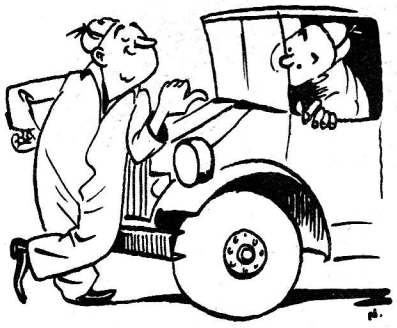
So plain every day logic dictates that we start by checking the sparks department—the ignition.

The first thing to do is operate the starter—with the ignition switch off. If the engine turns over snappy like, you can be pretty certain that all is well with the starter motor and the battery is in there punching. But suppose nothing but a puzzled look on your face is all that happens when you work the starter? Well, it could be one or more of the following (1) dead battery (2) loose or dirty connection in the starting circuit (3) defective motor (4) oil or grease on the bendix drive (5) locked starter.

But which? Well, let's turn on the head lights. Let Joe Mush over there operate the starter for you while you watch the headlights. If the lights go completely out it's a good indication that your battery is dead or there is a loose or dirty battery connection. You can check the latter by feeling the battery terminals and ground connection after the starter has been on for thirty seconds. Where there's any warmth, you've got the bad connection.

If the lights do not come on after the starter switch has been operated as above, it shows that the battery is completely discharged—due possibly to a short in the electrical system.

Now, suppose when the starter switch is operated, the lights merely dimmed—in this case you can enjoy a beer on Joe Mush by betting that the starter is locked. To win the bet call for some assistance, place the vehicle in high gear and push the vehicle **backwards.** (Don't let the boys play 'rock-a-bye baby' and push forwards or you stand a good chance of damaging the starter motor).



Suppose, however, that when you first operated the starter you got a buzzing noise indicating that the starter motor was turning over merrily but not engaging the fly-

wheel ring gear. This time you raise the ante to two beers with Joe Mush and bet him that there's either a broken bendix spring, bolt or a film of oil or grease on the bendix which is preventing the bendix gear from moving on the spiral shaft. The oil may be thrown there from a leaking rear main bearing and collected dirt until it has gummed things up enough to stop the gear from sliding. In this case you may get it to finally

engage by repeated jabs at the starter but the cause of the oil getting on there should be found and remedied.

Now, let's go back to the beginning again and assume that the engine turned over O.K. on the starter. First get Joe Mush to turn on the ignition switch. Meanwhile you've lifted the hood and removed one of the spark plug wires and now

at Joe again and he'll turn the engine over a few times with the starter while you note if any fuel comes through the loose gas joint. If gas appears you can tighten up the joint again. If it doesn't, then the fuel pump isn't pumping or the gas line is plugged. You can test the gas line by disconnecting it at the fuel filter and blowing back towards the tank. Have your pal Joe (who doesn't smoke around a vehicle) take the filler cap off the gas tank and listen for gurgles. Blow gently at first. If the air won't pass through the line, look for clogging at the places where it usually occurs—the couplings and shut-off valves. If Joe reports that he heard a gurgling, then it's logical to blame the fuel pump—repair it, or if necessary, replace it.

Back we go now to where you loosened the fuel line to the carburetor and fuel did come thru when the engine was cranked over, so you tightened the joint again.

Now, we want to see them spark plugs—so remove them and look at them. Look for wide gaps, split porcelain, heavy carbon or soot deposit or moisture from condensation causing shorts inside the plug.

If there was **no** spark from the ignition (Spark plug) wire when we previously checked it by cranking the engine over, there's trouble in the ignition circuit. O.K.—Dr. Joe Watson—the timing light, please. Now connect the timing light from distributor terminal to ground—if no light shows, look for loose connection or broken wire in primary ignition wiring. Next step would be to remove distributor cap—turn engine over until contact points are closed, remove coil wire from distributor cap—break points by hand while holding coil wire within ¼" of engine block. If no spark occurs, check condition of points and coil. If very weak spark, suspect condenser and coil but before you start tearing them out and tossing them in the junk bucket, make a close examination of the wiring and connections. Quite often that's where the leaks and partial shorts will be found. If spark is normal—a snappy blue one—look for moisture inside distributor cap, cracks or carbon runs, cracked rotor or improper breaker point opening.

After using the tactics we've outlined so far, you should have isolated the trouble.

Just one or two general points to remember—never blame a particular unit for trouble unless you have checked the other things in the circuit or system which may be responsible. Don't get the 'part changing' habit—this approach to solving the problem of why a vehicle won't start is wasteful, amateurish and what have you. The lad that knows his business is the one who tracks his trouble down with the aid of a little headwork and a lot less muscle work and gets nobody's blood boiling in the process.

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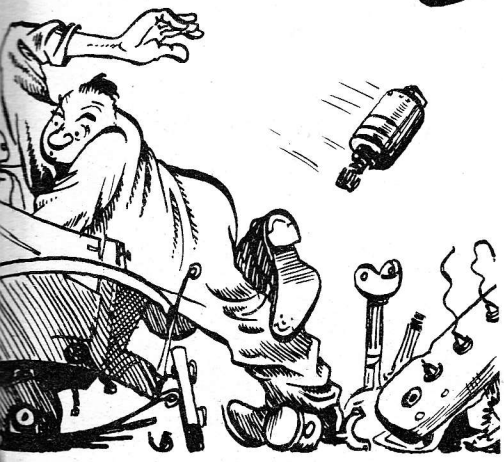
start a ed Vehicle



hold it within ¼" of the block while 'Amiable Joe' operates the starter. If you get a good snappy blue spark while the engine is revolving you know that current is flowing down the high tension line this far and reaching the spark plugs. But before you take them out for inspection, check the fuel system. Have 'Amiable' Joe Mush turn off the ignition while you loosen the fuel line leading into the carburetor. Wiggle your fingers

MOTORCYCLES

Helmets Crash . . .

a dome doily in the latest fash.

"Some guys never learn!" says Staff Sgt. Cranberry with a disgusted scowl, as he looked over towards the distant highway at a passing motorcyclist.

"What d'you mean?" says Sgt. Hutch.

"Some guys never learn that a crash helmet is designed to protect their necks—not to make 'em look pretty," replies Staff.

"Well, he was wearin' his," says Sgt. Hutch. "That's what he's supposed to do, isn't it?"

"Yeh—he was wearin' it all right—wearin' it as if it was his dress wedge—nonchalent like—with the chin straps flowing in the breeze. Just suppose he comes off—on a slick patch of ice the bike gets away from him—before he stops sliding his helmet has departed too—then he hits a fence post bareheaded. His first words when he comes to—if he comes to—are, "them crash helmets—they ain't worth wearing!"

"Yeh", agrees the Sarge, "I've seen it happen".

"So starting with your class tomorrow", says Staff, "I think it would be a good idea to tell 'em about crash helmets. You can point out that the idea of a crash helmet is to provide a measure of safety in an emergency. Tell 'em how the helmet is composed of two main parts—the shell and the harness. The latest design is so constructed that there's no danger of the shell coming away from the harness during a spill and leaving the rider wearing just the harness by the time he hits something".

"The shell itself, though it may look like just an overgrown football helmet, is a very carefully planned job, designed to strict specifications by motorcyclists of many years racing and riding experience in civilian and army life. First of all it's made of a special plastic type material and formed into a special shape that is designed to provide the best protection from impact shocks. The shell is actually designed to dent, but not shatter, at a certain impact force—this is so that it will absorb the shock and 'give'—instead of your neck having to—the theory being that helmets are easier to replace than necks and skulls. The shell is also capable of doing this shock-absorbing job regardless of whether the temperature is 130° in the shade or 35° below zero. The harness and curtain, too, is made just for the job. Those straps that fit across the inside of the shell keep the shell up off the top of your head and provide a 'safety' space to absorb the bump before it gets to your head. The curtain part is fitted into the shell so that it doesn't let the wind in—a mighty important little item especially in winter. But it's most important function is to keep the shell where it belongs—on top of the motorcyclist's head under all circumstances."

"Yeh, that's a point some of these monkeys seem to forget", puts in the sarg. "They like to use the harness to hang the helmet on the handlebars, or if they do decide they'll wear their 'crash hats' they don't bother doing up the dome fasteners and buckle of the chin strap—both tricks get the same result—when they **need** the helmet most, they've no got".

"Well, this new helmet is lighter and more comfortable to wear", says Staff, "So there should be no excuse for not wearing it properly"

"The trouble is", says Sergeant Hutch, "So many guys like to learn the hard way—but when it comes to crash helmets—that way is too late!"

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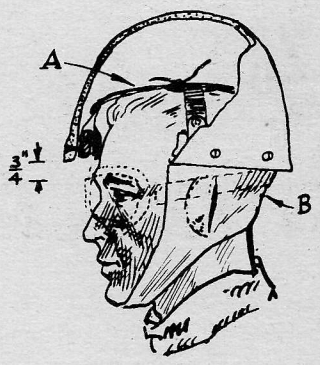
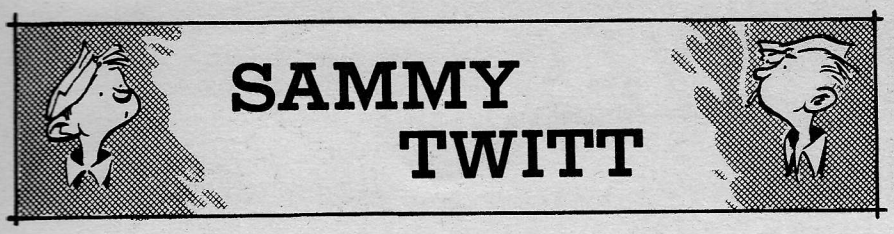
PERSONALITY OF THE MONTH...



No—this isn't a picture of Buck Rogers—we simply called for a volunteer and sawed him in half to show how the motorcyclists crash helmet is constructed—and to point out three important adjustments that assure a proper fit. They're important from both the comfort and

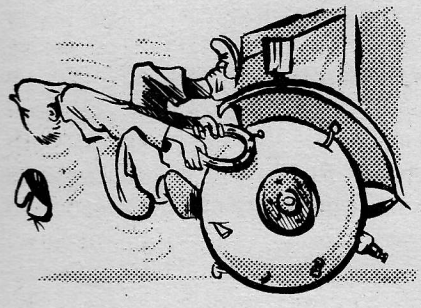
(Continued on Next Page)



One bright sunny day of a mornin'
Sam were bowlin' along wi' 'is load,
When a couple of 'Janes' on the sidewalk
Took Sammy's attention from t' road.

'Twere unlucky it just 'ad to 'appen
That C.O's car stood in 'is light,
'Cos Sam caught it right in t'indquarters,
Not like ships that pass by in t' night.

The Colonel 'e came up from nowhere
And let out a' norrible roar,
'Is face were the colour o' beetroot,
'Twere easy to see 'e were sore.



Well, they brought little Sam on t' carpe
Front o' Colonel Sir Fillingham Pott—
It's a good thing 'e'd 'ad a good breakfast
Else Sam might 'ave found 'imself shot.

As it wos 'e fixed Sam wi' 'is optic
And swallowed to keep back 'is rage,
'E'd a sheet that were covered wi' writin'
And 'e started at top o' the page.

"To start wi', yer brakes are to juggery;
You'll almit that it's simpler far
To give 'em a little adjustment
Than to punish my perishin' car".

"Them brakes if the're properly seen to
Will pull up yer truck in a trice,
But it seems that for months you've ignored 'em
And neglected yer Sergeant's advice."

"But it's sad for thee, lad," said the Colonel,
"That this isn't all by a sight.
Just look at this batt'ry, yer twollop,
It's thine and it's covered wi' blight."

"Wi' terminals sprouting wi' fungus
And plates just as dry as a bone.
'Ow the 'ell d'ye expect it to function?
It's a 'ard-worked component, ye'll own"

"But stick around, Sam," said the Colonel
"I'd just like to mention the tyres
Now look at these flints and old iron
Thee should pull from the treads wi' thy pliers."

"It's plain that yer don't seem to realize,
If yer leave things like this to get 'old
Ye'll be mendin' a series o' punctures,
Ay, 'appen in t'rain and in t' cold."

"Now, exhibit C," said 'is honour
Producing a ruddy great screw;
"We found that you'd put this in t'fuse box.
In place of a fuse what'd blew."

"If yer go and set fire to yer lorry
Through doin' such perishin' tricks,
I 'ope it's a reet proper blaze up
And you're right inside, in a fix."

"Them fuses is there for a purpose;
If one blows ther's a short, and begad,
You've to find it and not try to dodge it,
Or you'll get a real blow-up, me lad."

"Now, Sam," said 'is nibs, not unkind like,
"This'll 'urt me some more than yer think,
But tha's got to be learnin' tha lesson
So I'm givin' thee two weeks in clink."

"And while tha's a settin' all lonesome
Don't get down in a dudgeon or such,
But ponder on things I've been sayin"
If thinkin' don't 'urt thee too much."

"And when tha gets out o' the cooler,
Don't behave like a man in a trance
And wait for inspection ter cop thee,
But inspect on yer own, in advance."

"If tha finds summat just a bit awkward
As yer don't fee like tacklin' on t' spot,
Just report to yer senior off'cer,
He'll know what to do like a shot."

"Then per'aps if tha lives to be ninety,
The'll make thee a colonel like me
And tha'll spend all tha time makin' soldiers
Out o' bright little fellows like thee."

MOTORCYCLES—(cont'd)

safety angle—make sure you get them right on your bounce bonnet.

The first thing to do is make sure you get a helmet that fits you. They come in sizes to suit any model of cranium—even the shells themselves have been made in various sizes and the inner head bands of the harness are sized in 1/8 variations so that a good fit can be obtained.

Then the head straps (A) should be adjusted so that the helmet 'sits' high—about 3/4" above the eye-brows. That gives you plenty of safety space over your head and lets you get your goggles on properly.

Finally the curtain at the back (B) should be adjusted so that it is a snug fit. Take the trouble to get these adjustments right and you won't feel like hanging the helmet on the handlebars because it's too tight or too loose and too uncomfortable to wear.

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PLIERS

PLIERS ARE WHAT YOU DON'T USE IF ANY OTHER TOOL WILL DO THE JOB!

Sergeant O'Sweat quietly leaned across the fender and tapped Pte. Halftrak sharply on the skull with a handy ball peen hammer. The only effect was a faint look of enquiry on Halftrak's face as he looked up from where he was busy tightening up, what originally was a hex headed nut, with a pair of combination pliers.

"Never," says the Sarge, "use pliers on hex nuts and bolts. Of all the tricks that will let everyone know you're a deep green Driver Mechanic —that one is the surest. You've got a wrench to fit that nut, so why not use it? Don't tell me, let me guess —the wrench is in the tool box where you can't reach it without moving offer that fender and pliers can be made to fit a whole lot of nuts, bolts and fittings."

"But Sarge", says Halftrak, "the wrench won't go on this nut!"

DON'T USE PLIERS ON NUTS

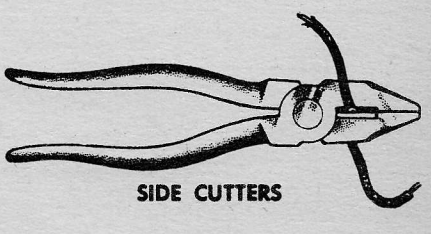
"Of course it won't," growls O'-Sweat, "and I'm gonna tell you why. See these teeth inside the jaws—well —when you use pliers on nuts and bolts, they chew and burr the corners up faster than Fido does a bone. Then when some self-respecting driver comes along and goes to use a wrench on that nut, he can't be-cause there are no wrenches made to fit the shape that you've got the nut into."

"While we're on this subject, I might as well give you a few more pointers on your favourite weapon of destruction—then at least you should be able to take care of them or any other pliers you might have to use."

"There are several types of pliers. **Diagonals**—can be used for pulling cotter pins, like when the cotter pins are in castellated nuts as used on connecting rods and main bearing caps. When installing cotter pins, diagonals come in very handy for cutting the cotter pin to the right length and for spreading the ends of the pin. **Long nose pliers** come with variously shaped jaws and can be used for getting at washers, pins and collets, etc., that are in hard to reach spots. Then there are regular **side cutting pliers** for electrical work and many special types that are designed to do certain jobs. Don't use pliers on hardened surfaces—it dulls the teeth and they lose their grip—and remember, pliers, like all other tools, should be kept clean by wiping them now and then with an oily rag, and while you're at it put a drop of oil on the pin joint. These little touches will cut down wear and prevent rusting. But most of all, remember what I told you about pliers being used on hexagon nuts and bolts. In fact, a good rule to keep under your melton is, don't use pliers when any other tool will work.

DIAGONAL PLIERS

DUCKBILL PLIERS



SIDE CUTTERS

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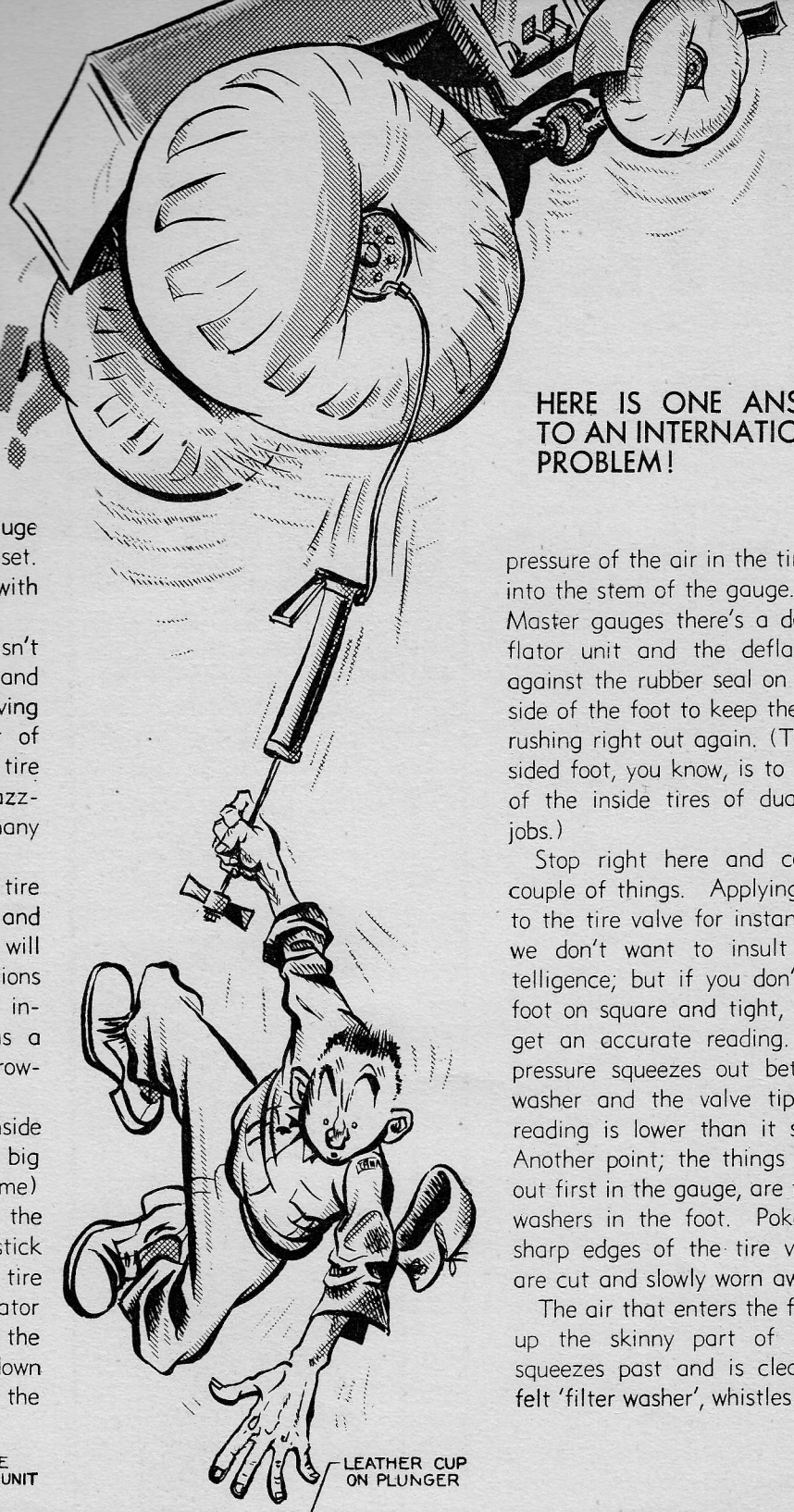
What Controls INFLATION?



HERE IS ONE ANSWER TO AN INTERNATIONAL PROBLEM!

Not very long ago, the tire gauge was made part of the vehicle tool set. Today, every vehicle is equipped with one.

The tire gauge—to look at—isn't a very imposing instrument and rumour has it that it's not receiving the proper care. As a matter of fact, you mention the driver's tire gauge and you'll draw a sharp razz-berry from many a driver and many a mechanic.

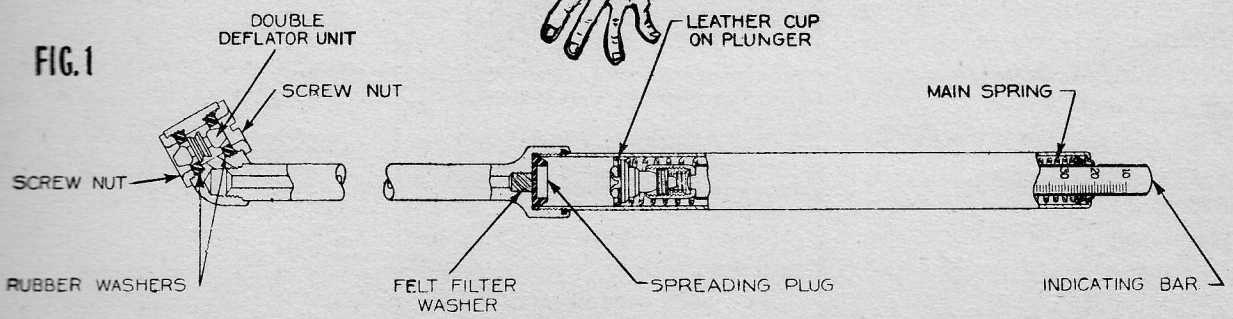
But the fault is not with the tire gauge. It's a sturdily constructed and satisfactory instrument, and will stand up under the normal conditions of use in the field. It wasn't intended, however, to be used as a supplementary hammer or as a crow-bar for light work.

Take a look at what's on the inside of the gauge (Fig. 1 shows the big gauge but the works are the same) and you'll see why. There's the "foot", the part of the gauge you stick on the tire valve when checking tire pressure. Inside the foot is a deflator unit. When you put the foot on the tire valve, the deflator pushes down the tire-valve core and allows the pressure of the air in the tire to rush into the stem of the gauge. On the Master gauges there's a double deflator unit and the deflator seats against the rubber seal on the other side of the foot to keep the air from rushing right out again. (The double sided foot, you know, is to take care of the inside tires of dual-wheeled jobs.)

Stop right here and consider a couple of things. Applying the foot to the tire valve for instance. Now we don't want to insult your intelligence; but if you don't get the foot on square and tight, you won't get an accurate reading. The air pressure squeezes out between the washer and the valve tip and the reading is lower than it should be. Another point; the things that wear out first in the gauge, are the rubber washers in the foot. Poked at the sharp edges of the tire valve, they are cut and slowly worn away.

The air that enters the foot rushes up the skinny part of the stem, squeezes past and is cleaned by a felt 'filter washer', whistles through a

FIG. 1



small passage in the 'spreading plug' and strikes the 'plunger'.

The plunger activates the gauging mechanism. Its nose is inserted in the bottom end of the calibrated 'indicating bar' and its shoulders push against the coiled 'main spring'. The tension of this main spring and the air pressure striking the plunger decide how far out the calibrated indicating bar will be pushed. The indicating bar pops out the end of the gauge and you have your reading.

To protect the guts of the gauge from normal metal corrosion, the inside of the barrel containing the coil spring and indicator, is nickel plated, the indicating bar itself is nickel plated and the whole is lubricated.

And there you have the simple, non-mysterious mechanism of the tire gauge. Nothing to fall apart or wear out easily.

Well, what will damage the gauge?

As mentioned before, using the gauge as a hammer just because you happen to have it in your hand, will dent the barrel. Any dent in the barrel prevents the plunger from riding smoothly—it may even stop it altogether—giving you erratic readings according to where the dent happens to be, and what the pressure of the particular tire being checked, happens to be.

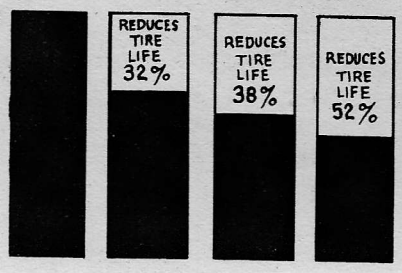
Oil getting into the foot will attack and ruin the rubber seals.

Any water—especially salt water—entering into the mechanism will eventually cause corrosion and rust which will damage and otherwise interfere with the operation of the plunger. Dust and dirt will do the same. Dirt accumulating in the foot is responsible for clogging many gauges.

The favorite trick of applying the gauge foot to a valve that happens to be bent down to the wheel rim, and then prying the valve up to where it's more easily reached, will beat up the washers.

Proper inflation helps to insure maximum tire life.

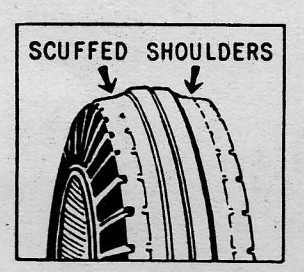
CHECK TIRE PRESSURE



This chart shows how the normal mileage or effective life of a tire is reduced by under-inflation.

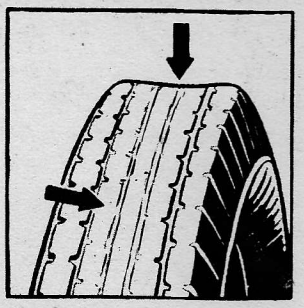
IF TIRES ARE **UNDER** INFLATED

Gasoline is wasted as more power is needed to move the vehicle.
Tires scuff and wear due to improper road contact. Tires flex too much and are apt to bump through causing casing failure.



A result of under-inflation

IF TIRES ARE **OVER** INFLATED



The result of over-inflation

Improper road contact which causes abnormal wear. Tires ride hard and are more subject to stone bruises, blow-outs, etc.
The non-skid properties which are built into the tires are greatly reduced.

You see—just a lot of little foolishness that common sense will avoid.

Taking the gauge out of the tool box where it picks up dirt and gets knocked around by heavier tools is the first common sense move. Hang the gauge in the cab, foot down. This will keep the indicating bar from working out and being damaged. There are several ingenious methods of doing this—one of the simplest we've heard about is cutting the thumb out of an old glove and using it as a pocket to hang the gauge up inside the cab.

Every tire shop has a master gauge to check the driver's gauges by. The master gauge is an expensive precision-built instrument and we suggest a slight ritual take place every week or so in which each driver approaches the Master Gauge with fear and trembling to have his tire gauge checked.

Non-serviceable driver's gauges should be exchanged for new ones—turn them into the local Spare Parts depot and they'll shoot them through to CMD for adjustment and repair by the manufacturers.

Question: "Why not design the gauges so they can be recalibrated in the field?"

Answer: "It's not too difficult to recalibrate the gauges for one particular reading, but it takes a whole set of master gauges and instruments to recalibrate them correctly for all pressure readings."

Turning the whole matter of the tire gauge over in our mind the other night while fondling a glass of stale beer, it seemed to us that here was a pretty good thing. Imagine a mass-produced instrument with a range of from 10 to 120 lbs. capable of checking every tire in the Army! Not bad!

If you don't believe us, go get your own glass of beer and think it over. We'll wait right here for your answer.

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TURRET TALK

Sir Humphrey Davy was a pretty smart fellow because way back in 1815 he invented a gadget that you'll find on your 1944 model tank. Not that he had you in mind when he decided to get busy and invent something—but he did have highly inflamable and explosive gases in mind when he invented the Davy Lamp. It seems that a lot of perfectly good fellow countrymen of Sir Humphrey's were taking the rap walking around with open flame lamps looking for coal in coal mines. They'd wander into a patch of Methane gas and—bingo! It might be said that the situation looked black in the mines.

But the Davy Lamp was the answer. It was quite simple too and the principle of the idea can be demonstrated with a piece of wire screen and an ordinary gas stove burner (Fig. 1). The lamp flame was enclosed by a fine wire gauze screen. When Bill Byrachywyer the miner got his lamp into a cloud of methane the screen dissipated the heat of the flame so rapidly that the gas surrounding the outside of the lamp never reached high enough temperature to ignite.

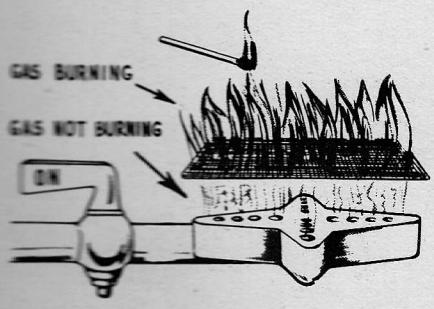

FIG. 1

O.K.—What about our tanks? Just inside the filler caps of the gasoline tanks, you'll find a screen that works just like the screen in the Davy lamp. No, they're not just gasoline strainers Dimwitty—sure they'll keep out the old socks, empty bottles and stuff that might be in the gasoline, but their main purpose is to stop sparks from a heel plate (**you** know you shouldn't be wearing them Dimwitty, but **we** know you forgot today) or a hose nozzle, or any outside flame from igniting the highly explosive contents of the tanks. So don't be taking them out to get the petrol in faster—and **perleese** don't get the idea that you can light matches to see how full the gas tank is even with flame arresters fitted because that way you'll follow the regular route of all people who do this—straight up! All the flame arresters will do is prevent the gas tank from following you up.

It is still possible, of course, for an engine to catch fire through an electrical short or other outside igniting agent and to take care of such a situation special protective apparatus in the form of cylinders of carbon dioxide (CO_2) which discharge into the engine compartment can be brought into use from either inside or outside the tank. Carbon dioxide (not to be confused with carbon monoxide) is not poisonous (its the same stuff they use in soda pop.) but it's suffocating—you can't breath in it as it doesn't contain oxygen in any form capable of sustaining human life in breathing. Since a fire requires oxygen to burn you can see that carbon dioxide will do a good job of smothering.

The best procedure to follow in case of a fire in the engine compartment is as follows:

(1) Stop engine

(2) If rear doors are open close them

(3) Pull ONE extinguisher handle.

If the fire is not extinguished immediately:

(4) Pull second extinguisher handle.

Once a handle has been pulled the container empties completely and the handle cannot be replaced. So make sure that the containers are recharged as soon as possible.

The portable 4lb CO_2 extinguishers are operated by pulling the trigger with the left hand and directing the discharge cone towards the base of the flame with the right hand. The flow of gas depends on how far you depress the trigger—so pull trigger only part way at first and increase flow as fire is put out.

A last word of warning—Don't drop the cylinders off the top of the turret onto the concrete floor—any cylinder containing gas under high pressure is as dangerous as a loaded shell. So handle 'em with care.

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NON SKID CHAINS . . .

(Continued from page 67)

a side skid because each link acts as a banana peel. So slow way down, especially on corners and high crowned roads.

It's always a good idea to put your chains on **before** you get stuck—unless you **like** doing it the hard way.

When you have to drive through an especially tough drift or particularly soupy stretch, where you're apt to lose traction, keep the vehicle moving if possible. Traction is a helluva lot easier to keep than regain.

If you do get in a jam, don't get excited and pour on the gas—you can dig yourself in pretty deep in no time with chains on. A steady even throttle will generally get you out of most bad spots.

So once you put chains on the rest is up to you—just remember chains don't convert your truck into a tank or track laying vehicle, and act accordingly. They may be called Non-Skid chains but the 'non skid' part is still strictly mythical unless the driver uses his head.

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HEADLIGHTS.

(Continued from page 66)

cause the source of light and reflector surfaces to be changed from their original relative positions. The lamp is out of focus—and this applies to sealed beam units too. The remedy is to replace the bulb and/or tighten reflector in ordinary lamps and replace the unit in the case of sealed beam types.

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CORRECTION PLEASE

On page 51 of the January issue, in the article on Cylinder Head Studs, we quoted the Service Information wise guys as saying that when you tighten the cylinder head studs on valve-in-head engines you must also check the valve clearances because they'll change—which is fine—so they will—but not the way we said. Of course they **close** up, not **open** up. Tsk, Tsk what those scribe fellows called us!—in Latin!

DIRT PACKED CLUTCH

If you discover that you're not able to push the clutch pedal all the way down in the radial-powered medium tanks, or gun carriages (or if the gears clash when shifting), it's probably not a sign that you're getting hardening of the arteries. More likely it's caused by an accumulation of dirt and dust inside the clutch. If you force the clutch pedal down, you'll pack the dirt solid and will eventually bend the clutch linkage. So, when you run across such conditions, don't force the clutch pedal.

Instead, while the engine is idling, work the pedal up and down, being careful not to push it past the blocked position. This will work the dirt free and the motion of the flywheel will tend to throw the dirt out.

If you're lucky enough to have compressed air around, blow the clutch out at regular intervals—say, once a day in dusty country.

When you do all this and the clutch still won't work freely, you'll have to pull the engine, disassemble and clean the clutch.

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NOISY VALVE LIFTERS

Never Attempt To Quiet Noisy Valve Tappets By Setting Them Closer Than Manufacturer's Specifications.

When valve tappets are adjusted to proper setting and are still noisy, the trouble MUST be assumed to be sticking valves, valve springs too strong, valve springs too weak, worn guides, worn stems, worn lifters and guides, and rounded valve stem ends or hollowed tappets. Freeing-up sticking valves with penetrating or gum dissolving oils sometimes stops the noise. Most cases of valve failure (burning and pitting) can be traced to setting tappets too close.

Checking valve clearance with engine running may not be accurate if valves are sticking.

Valves should not usually be checked or adjusted until engine is at normal operating temperature.

Slight noises in valves and lifters are usually not serious if due to normal wear, and need no correction until the vehicle is due for a 5000 mile inspection.

A scraping noise in the valve mechanism may indicate scored cams and mushrooms and demands immediate attention.

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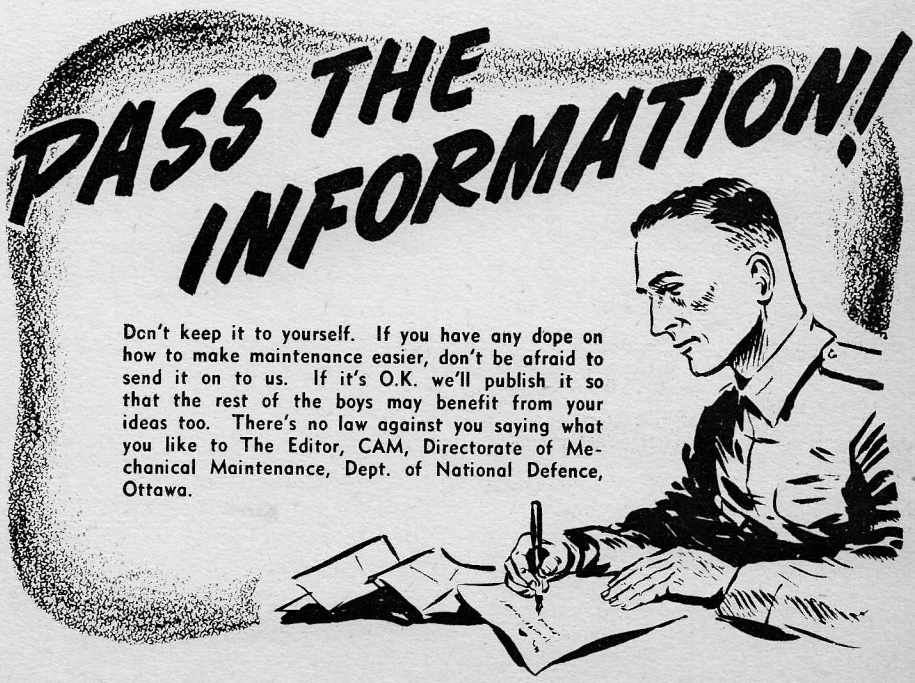
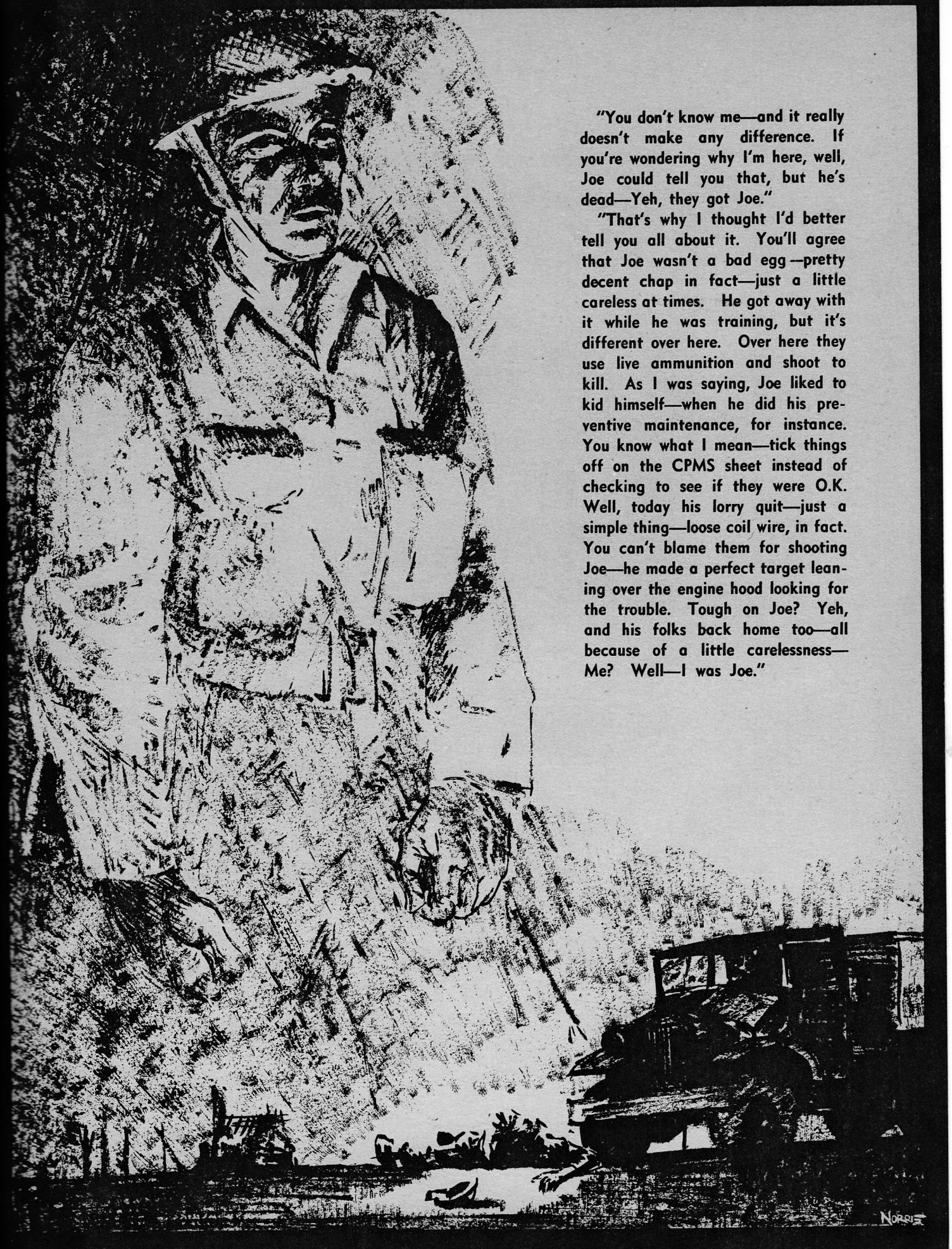




"You don't know me—and it really doesn't make any difference. If you're wondering why I'm here, well, Joe could tell you that, but he's dead—Yeh, they got Joe."

"That's why I thought I'd better tell you all about it. You'll agree that Joe wasn't a bad egg—pretty decent chap in fact—just a little careless at times. He got away with it while he was training, but it's different over here. Over here they use live ammunition and shoot to kill. As I was saying, Joe liked to kid himself—when he did his preventive maintenance, for instance. You know what I mean—tick things off on the CPMS sheet instead of checking to see if they were O.K. Well, today his lorry quit—just a simple thing—loose coil wire, in fact. You can't blame them for shooting Joe—he made a perfect target leaning over the engine hood looking for the trouble. Tough on Joe? Yeh, and his folks back home too—all because of a little carelessness—Me? Well—I was Joe."

IMPORTANT MESSAGE ON TIRES FROM N.D.H.Q.

Tire News

EXTRA!

PRICELESS

VOLUME LIMITED — FEBRUARY, 1944

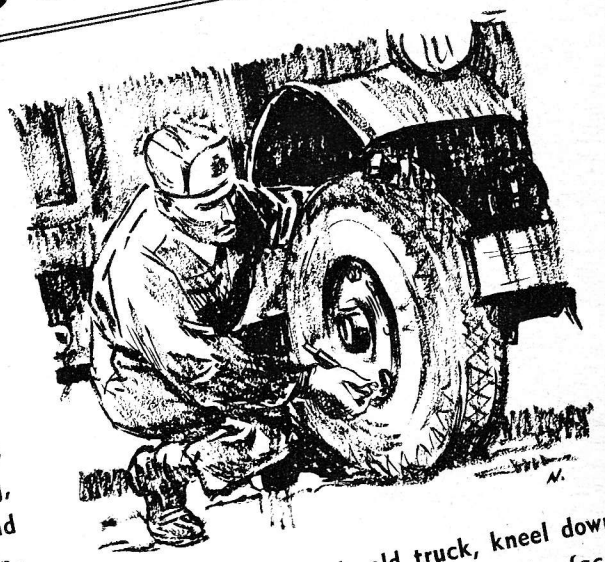
NO MORE NEW TIRES!

EXCEPT IN THEATRES OF OPERATIONS!

You know what that means soldier? That means if you had to bestow loving care on your tires before—from now on it's a case of "I've got one tire to last me all my life".

You have to get along with the casings you've got and make them do for three recapping jobs—that's going to mean watching air pressures like a hawk—inspecting tires for cuts and breaks and reporting them promptly; accelerating and braking with care; avoiding, whenever you can, rocks, stumps, ruts and ditches; reporting signs of uneven wear indicating faulty brakes or wheel alignment and seeing that tires are removed for recapping BEFORE the non-skid design has completely worn off.

So there's only one last thing we can think of, to get you to realize, to feel down in the core of your brain how desperately fixed we are about rubber.



Go out to your little old truck, kneel down by a tire, look that tire square in the face. Punch it with your fist, feel it between your fingers, smell it, look right at it.

Now say to yourself, "There ain't no more where you came from baby."

Then think hard what that means!